Enhanced Boron Doping in Arc-Discharge Synthesized Graphene for Improved Electrochemical Performance

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Abstract
Boron-doped graphene is a promising material for various electrochemical applications, but its low doping rate has limited its use. In this study, boron-doped graphene with higher doping efficiency in arc discharge synthesis was synthesized by using a boron precursor and graphene oxide as an anode carbon filler. X-ray photoelectron spectroscopy revealed a doping level of 5.7 at.% in the as-synthesized graphene flakes, which is much higher than reported in the literature. The boron dopant improved the electrochemical properties of boron-doped graphene with an areal capacitance of 66 μF cm^{-2}, which is superior to other doped carbon materials. The electrochemical activity of boron-doped graphene was affected more by the functionalized doping than the alternative doping because of the improved wettability by the functionalized doping. Raman spectroscopy demonstrates the motion of the G and 2D bands of boron-doped graphene flakes, providing insight into their structural properties. Our results suggest that arc-discharge synthesis of boron-doped graphene can be a good way to mass-produce boron-doped graphene flakes for various electrochemical applications.[1][2]

References

[1] T. V. Pham; J-G. Kim; J. Y. Jung; J. H. Kim; H. Cho; T. H. Seo; H. Lee; N. D. Kim and M. J. Kim;
[2]

Figures

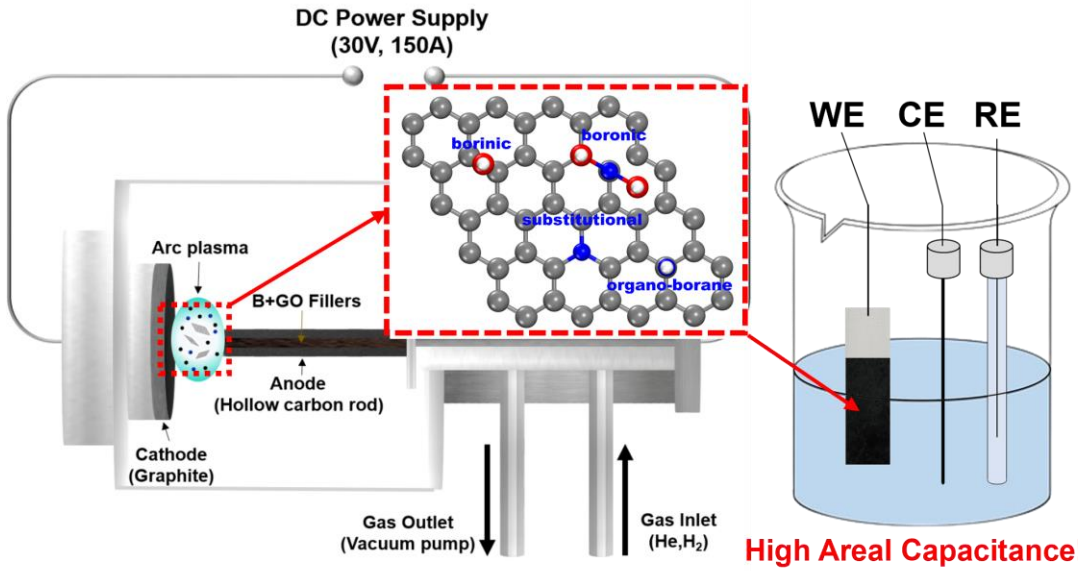

Figure 1: Schematic of arc synthesis and electrochemical application of boron-doped graphene.